

**What is claimed is:**

1. An adaptive ink supply for a printing system for use in lieu of a first ink cartridge, the printing system having a receptacle for receiving the first ink cartridge, the  
5 receptacle containing an interconnect platform, a printing system electrical connector which protrudes from the platform, has at least two sides, and has an end containing a plurality of resilient electrical contacts protruding from the end, a controller which exchanges information with a first memory device mounted to the first ink cartridge containing information concerning ink in the first ink cartridge, an ink supply sleeve  
10 protruding from the platform and surrounding a hollow needle fluidically connected to a printhead, the adaptive ink supply comprising:

an ink reservoir containing a replacement ink;

a fluid outlet in fluid communication with the ink reservoir which is sized to be received by the ink supply sleeve and to receive the hollow needle to allow ink to flow  
15 from the ink reservoir to the printhead;

an adapter connector having a base, a plurality of electrical contact pads mounted to the base and spaced side-by-side for engaging the electrical contacts of the printing system electrical connector, the adapter connector having at least one guide member which engages at least one of the sides of the printing system electrical  
20 connector for aligning the contact pads into engagement with the electrical contacts; and

a source of signals electrically connected to the contact pads of the adapter connector for exchanging information with the controller.

2. The ink supply of claim 1, wherein the adapter connector comprises a housing which is sized to be inserted at least partially into the receptacle, and wherein the contact pads are mounted to the housing.

5 3. The ink supply of claim 1, wherein the adapter connector comprises a housing which is sized to be inserted at least partially into the receptacle, the contact pads being mounted to the housing, the housing having an opening adjacent to the contact pads; and wherein

the ink reservoir along with the fluid outlet are slidably inserted into the housing,  
10 with the fluid outlet protruding through the opening.

4. The ink supply of claim 1, wherein the adapter connector comprises a housing which is sized to be inserted at least partially into the receptacle, the contact pads being mounted to the housing; wherein

15 the fluid outlet is secured to the housing; and wherein

the ink reservoir is located exterior of the housing and connected to the fluid outlet by a conduit.

5. The ink supply of claim 1 wherein the printing system has an air supply sleeve  
20 protruding from the platform and a hollow needle surrounded by the air supply sleeve and leading to an air pressure source, and wherein the ink supply further comprises:

an air inlet which is sized to connect to the air supply sleeve, the air inlet having a distal end which is adapted to be received by the air supply sleeve and to receive the hollow needle.

5        6.        The ink supply of claim 1 wherein the printing system has an air supply sleeve protruding from the platform and a hollow needle surrounded by the air supply sleeve and leading to an air pressure source, and wherein the adapter connector further comprises:

10            a housing which is sized to be inserted at least partially into the receptacle, the contact pads being mounted to the housing, the housing having an opening adjacent to the contact pads;

            a shell surrounding at least a portion of the reservoir, defining an air pressure chamber between the shell and the reservoir;

15            an air inlet extending from the shell which is sized to be received by the air supply sleeve and is adapted to receive the hollow needle delivering pressurized air from the hollow needle the pressure chamber for pressurizing the ink reservoir; and wherein

            the shell, the reservoir, the fluid outlet and the air inlet are removably inserted into the housing, with the fluid outlet and air inlet protruding through the opening.

20        7.        The ink supply of claim 1, further comprising a flexible conduit connected between the ink reservoir and the fluid outlet to allow the ink reservoir to be remotely located from the receptacle while the fluid outlet is connected to the ink supply sleeve.

8. The ink supply of claim 1 wherein one of the sides of the printing system electrical connector has a guide slot; wherein

the contact pads arranged along a line to define an x-axis direction;

the guide member of the adapter connector is positioned to engage the guide slot  
5 to provide alignment between the contact pads and the resilient electrical contacts along the x-axis.

9. The ink supply of claim 1 wherein the printer electrical connector has opposite lateral sides; wherein

10 the contact pads are located in a row defining two outer contacts on opposite ends of the row;

said at least one guide member includes at least one alignment member for engaging one of the opposite lateral sides.

15 10. The ink supply of claim 1, wherein the source of signals includes information regarding a volume of replacement ink in the ink reservoir.

11. The ink supply of claim 1, wherein the source of signals contains a memory device which has a write portion which is adapted to be updated by the controller to  
20 provide an estimate during usage of the quantity of replacement ink in the ink reservoir.

12. The ink supply of claim 1 wherein the source of signals is connected to the contact pads on the adapter connector by a flexible cable to enable the source of signals

to be remotely located from the receptacle while the adapter connector is in engagement with the electrical contacts of the printing system.

13. The ink supply of claim 1, further comprising:

5 a flexible conduit connected between the ink reservoir and the fluid outlet to enable the ink reservoir to be remotely located from the receptacle while the fluid outlet is connected to the ink supply sleeve; and

a flexible cable between the contact pads on the adapter connector and the source of signals to enable the source of signals to be remotely located from the receptacle while the adapter connector is in engagement with the printing system electrical connector.

10

14. The ink supply of claim 1, wherein the adapter connector comprises:

a housing which is sized to be inserted at least partially into the receptacle, the contact pads being mounted to the housing; wherein

15

the fluid outlet is carried by the housing adjacent to the contact pads; and

a flexible cable connects the source of signals to the contact pads to enable the source of signals to be remote from the receptacle while the adapter connector is in engagement with the electrical connector of the printing system.

20

15. An adaptive ink supply for a printing system for use in lieu of a first ink cartridge, the printing system having a receptacle for receiving the first ink cartridge, the receptacle containing an interconnect platform, a printing system electrical connector

which protrudes from the platform, has at least two sides, and has an end containing a plurality of protruding resilient electrical contacts protruding from the end, the electrical contacts including two pairs of volume sensing contacts, a controller which exchanges information with a first memory device mounted to the first ink cartridge concerning ink  
5 in the first ink cartridge, an ink supply sleeve protruding from the platform and surrounding a hollow needle fluidically connected to a printhead, the first ink cartridge having a pair of inductive coils for sensing ink quantity therein, each of the inductive coils adapted to be electrically connected to one of the pairs of the volume sensing contacts when the first ink cartridge is installed in the receptacle, the adaptive ink supply  
10 comprising:

an ink reservoir containing a replacement ink;

an fluid outlet in fluid communication with the ink reservoir which is sized to be received by the ink supply sleeve and to receive the hollow needle;

an adapter connector having a base and a plurality of electrical contact pads  
15 mounted to the base for engaging the electrical contacts of the printing system electrical connector;

a source of signals electrically connected to the contact pads of the adapter connector for exchanging information with the controller; and

a circuit connecting at least one of the pairs of the volume sensing contacts to  
20 each other for enabling a continuity check to be made by the controller once the adapter connector is connected to printing system electrical contacts.

16. The ink supply of claim 15, wherein the adapter connector comprises a housing which is sized to be inserted at least partially into the receptacle, the contact pads being mounted to the housing, the housing having an opening adjacent to the contact pads; and wherein

5 the ink reservoir along with the fluid outlet are slidably inserted into the housing, with the fluid outlet protruding through the opening.

17. The ink supply of claim 15, wherein the adapter connector comprises a housing which is sized to be inserted at least partially into the receptacle, the contact pads being  
10 mounted to the housing; wherein

the fluid outlet is secured to the housing; and wherein

the ink reservoir is located exterior of the housing and connected to the fluid outlet by a conduit.

15 18. The ink supply of claim 15 wherein the printing system has an air supply sleeve protruding from the platform and a hollow needle surrounded by the air supply sleeve and leading to an air pressure source, and wherein the adapter connector further comprises:

20 a housing which is sized to be inserted at least partially into the receptacle, the contact pads being mounted to the housing, the housing having an opening adjacent to the contact pads;

a shell surrounding at least a portion of the reservoir, defining an air pressure chamber between the shell and the reservoir;

an air inlet extending from the shell which is sized to connect to the air supply sleeve, the air inlet having an end which is adapted to be pierced by the needle in the air supply sleeve for delivering pressurized air from the air supply sleeve to the pressure chamber for pressurizing the ink reservoir; and wherein

5           the shell, the reservoir, the fluid outlet and the air inlet are removably inserted into the housing, with the fluid outlet and air inlet protruding through the opening.

19.    The ink supply of claim 15, further comprising a flexible conduit connected between the ink reservoir and the fluid outlet to allow the ink reservoir to be remotely  
10   located from the receptacle while the fluid outlet is connected to the ink supply sleeve.

20.    The ink supply of claim 15 further comprising at least one guide member which engages at least one of the sides of the printer electrical connector for aligning the contact pads into engagement with the electrical contacts.

15           21.    The ink supply of claim 20 wherein the contact pads arranged along a line to define an x-axis direction;

          the guide member of the adapter connector is positioned to engage at least one of the sides of the printer electrical connector to provide alignment between the contact  
20   pads and the resilient electrical contacts along the x-axis.

22. The ink supply of claim 15 wherein the source of signals contains a memory device which has a write portion which is adapted to be updated by the controller to provide an estimate during usage of the quantity of replacement ink in the ink reservoir.

5 23. The ink supply of claim 15 wherein the source of signals is connected to the contact pads on the adapter connector by a flexible cable to enable the source of signals to be remotely located from the receptacle while the adapter connector is in engagement with the electrical contacts of the printing system.

10 24. A method for adapting an ink supply to a printing system which is configured to utilize a first ink cartridge which has a first memory device containing data concerning ink in the first ink cartridge, the printing system having an interconnect platform containing a fluid inlet with a hollow needle surrounded by a sliding biased sealing collar, a printing system electrical connector which protrudes from the platform, has at  
15 least two sides, and has an end containing a plurality of protruding resilient electrical contacts protruding from the end, the electrical contacts including two pairs of volume sensing contacts, a controller which exchanges information with the first memory device concerning ink in the first ink cartridge, the first ink cartridge having a pair of inductive coils for sensing ink quantity therein, each of the inductive coils adapted to be  
20 electrically connected to one of the pairs of the volume sensing contacts when the first ink cartridge is installed in the receptacle, the method comprising:

(a) providing an adaptive ink supply having an ink reservoir with a fluid outlet, an adapter connector having a plurality of contact pads for engaging the electrical

contacts on the electrical connector, and a source of signals which contains electronic information which is readable by the controller to enable the printing system to operate;

(b) coupling the fluid outlet of the ink reservoir to the fluid inlet, depressing the sliding collar with an end of the fluid outlet and inserting the hollow needle of the fluid inlet into the fluid outlet to supply ink from the reservoir;

(c) engaging the adapter connector to the electrical connector of the printing system so that the contact pads engage the electrical contacts of the printing system electrical connector; and

(d) exchanging information between the controller and the source of signals to enable the printing system operate.

25. The method of claim 24, wherein step (a) also comprises:

electrically connecting the volume sensing contact pads of at least one of the pairs to each other; and step (d) comprises:

performing an electrical continuity check by supplying voltage from the controller to said at least one of the pairs.

26. The method of claim 25 wherein:

step (a) includes providing the source of signals with a memory which contains information concerning the volume of the ink reservoir and which may be written to; and

step (b) includes by using the controller, reading the volume information and writing to the memory with a new estimate of volume during usage.

27. The method of claim 24, further comprising the step of locating the source of signals remotely from the printing system.

5 28. The method of claim 24, further comprising the step of locating the ink reservoir remotely from the printing system.

29. The method of claim 24, further comprising the steps of locating the source of signals and the ink reservoir remotely from the printing system.

10

30. An adaptive ink supply for a printing system having a receptacle containing a platform, the receptacle including an electrical connector which protrudes from the platform and has an end containing a plurality of resilient electrical contacts protruding from the end, the receptacle including a fluid inlet that includes a hollow needle surrounded by a sliding sealing collar, the fluid inlet includes an ink supply sleeve that surrounds the sliding collar and the hollow needle, the printing system includes printing system control electronics for controlling printing operations, the ink supply comprising:

15

a housing which is adapted to be at least partially inserted into the receptacle, the housing having a leading end;

20

a fluid reservoir for containing replacement ink;

a fluid outlet in fluid communication with the fluid reservoir, the fluid outlet including a distal end member which is sized to be received by the ink supply sleeve, the

distal member is adapted to depress the sliding collar and receive the hollow needle of the fluid inlet for supplying the replacement ink to the printing system;

a plurality of electrical contacts mounted to the housing for engaging the electrical contacts of the electrical connector; and

5 an information storage device coupled to the contact pads exchanging information with the printing system control electronics.

31. The ink supply of claim 30 wherein the printing system includes an air outlet, the air outlet includes a hollow needle protruding from the platform and in  
10 communication with a pressure source, the air outlet includes an air supply sleeve protruding from the platform and surrounding the hollow, wherein the ink supply further comprises:

a shell surrounding at least a portion of the fluid reservoir, defining an air pressure chamber between the shell and the reservoir;

15 an air inlet in communication with the pressure chamber, the air inlet including a distal end member that is sized to be received by air supply sleeve, the distal end member adapted to receive the hollow needle for connecting the pressure source to the pressure chamber; and wherein

20 the shell, the reservoir, the fluid outlet and the air inlet are adapted to be removably inserted into the housing to provide a fluidic connection between the fluid outlet and the fluid outlet and to provide a connection between the air inlet and the air outlet.

32. The ink supply of claim 30, further comprising:

a flexible cable which connects the information storage device to the contact pads to enable the information storage device to be located remotely from the receptacle while the contact pads are in engagement with the electrical connector of the printing system.

33. The ink supply of claim 30, wherein:

the fluid outlet is secured to the housing; and the ink reservoir is located exterior of the housing and connected to the fluid outlet by a conduit.

34. An adaptive ink supply for a printing system having a controller for controlling printing operations and a receptacle including a spring loaded platform and a latch portion, the spring loaded platform having a fluid outlet and an electrical connector, the connector having a plurality of receptacle contacts, the adaptive ink supply comprising:

a housing adapted to be at least partially inserted into the receptacle in a first direction, the housing including a latch feature adapted for engaging the latch portion, the latch feature adapted to receive the latch portion in the first direction;

a fluid outlet adapted to engage the fluid inlet;

a plurality of container contacts adapted to engage the receptacle contacts;

an ink supply circuit connected to the plurality of container contacts, the ink supply circuit provides signals to the controller indicative of a state of the adaptive ink supply.

35. The adaptive ink supply of claim 34, wherein the housing is adapted to depress the spring loaded platform such that the spring loaded platform exerts a force on the housing opposite to the first direction and wherein the latch feature provides a force in the first direction to balance the force of the spring loaded platform.

5

36. The adaptive ink supply of claim 35, wherein the housing has a trailing end relative to a direction of insertion of the housing into the receptacle, the latch portion is positioned near the trailing end of the housing, the latch portion extends downwardly relative to a gravitational frame of reference.

10

37. An adaptive ink supply for a printing system, the printing system including an ink supply receptacle, the adaptive ink supply comprising:

a housing adapted to be at least partially inserted into the receptacle in direction of insertion, the housing including alignment surfaces adapted to engage the receptacle to provide an alignment of the housing relative to the receptacle; and

15

a plurality of contacts mounted to the housing that are electrically coupled to a source of signals, the plurality of contacts arranged along a line for engagement with a corresponding linear array of contacts associated with the printing system, the line defining an x-axis, the x-axis substantially perpendicular to the direction of insertion, the alignment surfaces sufficient to provide alignment of between the plurality of contacts mounted to the housing and the corresponding linear array of contacts associated with the printing system.

20

38. The adaptive ink supply of claim 37, wherein the housing has a leading end relative to a direction of insertion, the housing includes first and second keying and guiding features located near the leading end, the keying and guiding form the alignment surfaces that provide alignment of the housing relative to the receptacle.